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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,023	10/19/2001	Chang Rock Song	054216-5003	7126

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EXAMINER
FOONG, SUK SAN

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 03/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/982,023	SONG, CHANG ROCK	
	Examiner	Art Unit	
	Suk-San Foong	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 January 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The material incorporated by reference is not now deemed essential.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 11, 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910).

Okuno et al., Iizuka and Lou are relied on for the teachings discussed in the rejections of paragraph 8 of the Office Action mailed on 10/24/02 and as follows.

The combination of Okuno et al. and Lou do not disclose forming interlayer insulating film comprised of silicate glass material such as PSG and USG.

The combination of Okuno et al. and Lou do not disclose performing NH_3 plasma process and N_2O plasma process prior to depositing BST dielectric film.

Yang et al. teach a method of forming capacitor on semiconductor devices which includes forming insulating layer 235 comprised of materials such as BPSG and phosphorous-doped silicon oxide over substrate 205 (Paragraph [0036], and Fig. 2B), then etching insulating layer 235 to form contact hole (Paragraph [0037], and Fig. 2C), subsequently forming ohmic contact layer 240 (Paragraph [0038], and Fig. 2D), then forming first electrode 245 comprised of

material such as ruthenium (Paragraph [0039], and Fig. 2E) by chemical vapor deposition method (Paragraph [0040]), subsequently performing a nitridation process on first electrode 245 (Paragraph [0040]), subsequently performing plasma process in ambients containing N_2O and, thus, forming barrier layer 250 (Paragraph [0047], and Fig. 2F), then forming BST dielectric film 255 over first electrode 235 (Paragraph [0049]), subsequently annealing BST dielectric film (Paragraph [0050], and Fig. 2G), and forming second electrode 260 such as ruthenium by chemical vapor deposition method on BST dielectric film 255 (Paragraph [0055], and Fig. 2I).

It would have been within the scope to one ordinary skill in the art to combine the teachings Yang with the combination process to enable the step of forming insulating film 20 of Okuno et al. to be performed.

It would have been within the scope to one ordinary skill in the art to combine the teachings of Yang et al. with the combination process because it would enable formation of first electrode 216 of the combination to be performed and obtain further advantage of reducing undesirable oxidation of its associated electrode (Yang et al., Paragraph [0074]).

The combination process does not disclose that the nitridation process is performed using a NH_3 plasma process.

Lee et al. discloses a method of forming capacitors for semiconductor devices which includes providing first electrode 30 comprised of material such as ruthenium (Col. 3, lines 50-52, Col. 4, lines 65-67, Col. 5, lines 31-34, and Fig. 1), subsequently performing a nitridation process using NH_3 plasma process (Col. 5, lines 4-12), then forming capacitor dielectric film 32 over first electrode 30 (Col. 3, lines 63-65, and Fig. 2), and then forming second electrode 36 over capacitor dielectric film 32 (Col. 4, lines 42-48, and Fig. 4).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Lee et al. with the combination process because it would enable the nitridation process of the combination to be performed and obtain further advantage of preventing oxidation of lower electrode and thereby improving the dielectric properties of the resulting capacitors (Lee et al., Col. 5, lines 12-15).

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above.

The rejection is maintained as stated in paragraph 9 of the Office Action mailed on 10/24/02.

5. Claims 3, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above, and further in view of Graettinger et al. ('709) as previously applied.

Graettinger et al. is relied on for the teachings discussed in the rejections of paragraph 10 of the Office Action mailed on 10/24/02.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above.

The rejection is maintained as stated in paragraph 11 of the Office Action mailed on 10/24/02.

7. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 14 above.

The rejection is maintained as stated in paragraph 12 of the Office Action mailed on 10/24/02.

8. Claims 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above.

The combination process does not disclose the thickness of first electrode 216 as recited in claim 8.

The combination process does not disclose the thickness of second electrode 218 as recited in claim 14.

The choice of thickness of the first electrode and the second electrode would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

9. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above.

The rejection is maintained as stated in paragraph 14 of the Office Action mailed on 10/24/02.

10. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okuno et al. ('262) in combination with Yang et al. ('334), Iizuka ('996), Lou ('605) and Lee et al. ('910) as applied to claims 1, 11, 13 and 16 above.

The rejection is maintained as stated in paragraph 15 of the Office Action mailed on 10/24/02.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

GF
March 13, 2003

George Fourson
Primary Examiner
Art Unit 2823